Field identification of the Indigobirds

Robert B. Payne

Résumé: Les Combassous sont des petites cailles parasitaires dé couvées et ils utilisent plusieurs espèces d'estrildidés, y compris l'Astrild-caille, le Bengali zébré, le Sénégalis et les amarantes. Ils imitent les chants de l'espèce hôte et apprennent ces chants lorsqu'ils sont élevés par leurs parents adoptifs. Les chants qui imitent ceux de l'espèce hôte sont la meilleure caractéristique pour identifier l'espèce Combassou sur le terrain. La plupart d'entre eux sont également distincts de par les couleurs du plumage, des ailes et des pieds du mâle à l'époque de la reproduction. Un petit nombre des mâles qui imitent les chants des différentes espèces d'estrildidés ont une apparence similaire, particulièrement les Combassous du Cameroun en Afrique de l'Ouest et il peut y avoir plus d'une espèce pour laquelle nous ne connaissons pas actuellement de différences morphologiques entre les Combassous adultes. Les chants de mimétisme, les plumages et les couleurs des mâles ainsi que les répartitions locales sont décrits pour les 10 espèces connues.

The indigobirds (*Vidua* species) are small finches which brood-parasitise estrildids and are widespread in Africa from the semi-arid scrub of the Sahel to woodlands. Many have been studied in the field[8,13,14,18-32] and there are more species than we knew about a few years ago. I have watched and tape recorded them and, with a good ear for their songs, they can readily be told apart.

Male indigobirds mimic the songs of their hosts or foster species which include not only the firefinches *Lagonosticta* species, but several twinspots *Hypargos* species, Goldbreast *Amandava subflava* and African Quail-finch *Ortygospiza atricollis*. Most indigobirds also look a little different in the field or in the hand, particularly the males in breeding plumage, which is not entirely black: since most are glossed with green, blue or purple in favourable light. In some the wing colour is distinctive, in some the feet (orange or whitish purple). In only a few cases, however, are female indigobirds also distinctive. Finally, the young indigobirds differ in mouth pattern and colour, so we can identify them as nestlings and dependent fledglings in the hand. However, these colours disappear shortly after the birds become independent of their foster parents. In many areas, as many as four species of indigobirds live together within one kilometre of each other, and we are still finding out how widely distributed the more recently recognised species are in West Africa.

When the foster species rear the young indigobird together with their own young[13,14], the indigobird learns the foster species' song. The adult male indigobird mimics the songs of the foster species and so he advertises his upbringing when he sings. Males sing from certain perches or 'call-sites' through the day and from week to week, and these are the places to listen to their songs. Females visit males that mimic the songs of their own kind of foster parents and mate with them at these call-sites. Because the females are attracted to males that sing like their foster parents, they mate with the males that were reared by the same foster species. This is important to their breeding. The young of the foster species each have their own characteristic pattern of mouth colours, spots, and gape papillae. When young indigobirds have been found, their mouths mimic the mouth colours of their foster nest-mates. And when a female is attracted to a male with a song like her foster parent, she ensures that her nestlings will have the same mouth pattern and can be reared without discrimination against them by the foster adults.

The song mimicry of the indigobirds is a mating signal and allows us to recognise the indigobirds parasitising a particular host as a biological species. For example, the green-glossed male indigobirds in Senegal, blue-glossed birds in Nigeria, purple in Ethiopia, blue in east and south-central Africa and the red-billed, blue birds in southern and coastal East Africa are all one species, the Village Indigobird *V. chalybeata*, as they all mimic the songs of Red-billed Firefinch *L. senegala*. A series of museum skins reveals the same thing: although in plumage, bill and foot colour and in size these regional populations are as distinct from one another as many other indigobird species[20], they almost all integrade at the edge of their ranges.

Before birders watched them in the field, some museum ornithologists considered the indigobirds a single species, and others recognised as many as eight[9,10,20,35]. It was only when Nicolai[16] recognised the

songs of his aviary birds as a mimicked version of their foster species' songs that we had a good behavioural basis for understanding the group.

Nevertheless, the story is not as simple as a one-parasite/one-host species relationship would suggest. Firstly, a few odd males mimic the song of another kind of indigobird, and this probably results from the odd female (the mother of the odd males) laying in the nest of another species of finch which sometimes raises her young. Secondly, not all populations which have distinctive mimetic songs are also distinct in plumage colour. We do not know whether these are similar-looking yet distinct species, or local populations where the descendants of a particular female which switched hosts are behaviourally associated with their new host species but have not yet evolved any genetic differences from their recent indigobird ancestors. Unless a morphological difference such as fledgling mouth colour pattern exists, these look-alike populations are considered a single species[29,30,32]. Most common names for the indigobirds are associated with their foster species[2,6]. But for certain indigobirds we use a name based on their appearance or the area where they were first described, especially where there is not a one-to-one match between the brood parasites and their host species[20,29,32]. In the species descriptions, I have followed the names which will be used in a forthcoming volume of *Birds of Africa.*

Indigobird sp *Vidua sp*
Mark Andrews

Village Indigobird *Vidua chalybeata*

Village Indigobirds are red-billed (*V. ch. amauropteryx*) in southern and white-billed in the rest of Africa. They all mimic the songs of the same foster species, the Red-billed Firefinch. In southern Africa, the females as well as the males are red-billed, and where I watched colour-ringed birds at Lochinvar National Park in southern Zambia, the red-billed females visit and mate with the red-billed males, and ignore the other kinds of indigobirds that mimic the songs of other foster species[28,32]. At Maun, Botswana, where white-billed birds (*V. ch. centralis)* are common, a few are red-billed as in eastern Botswana. They sing in the same call-sites and have the same local songs as the white-billed males. I tape-recorded the white-and red-billed males as they appeared one after another on a song tree[20]. They have the same behaviour and attract the same females, so they are considered the same species. In West Africa these indigobirds are smaller, black-winged (rather than dark brown), and are glossier in plumage, green in Senegal (*V. ch. chalybeata*) and blue in Nigeria and Cameroon (*V. ch. neumanni*). In Ethiopia, they are purple with black wings (*V. ch. ultramarina*). Specimens of the Ethiopian race appear in the same localities as the Red-billed Firefinch, and I have recorded a captive male that mimics the songs of this species. All these indigobirds have bright orange to red feet, they intergrade by way of intermediate populations, and they all have the same mimicry songs and brood parasitic behaviour[20].

Like all indigobirds, the Village Indigobird male has two sets of songs. One set matches the songs and calls of the foster species, and the other set does not. The non-mimetic songs are 'chattery' and do not help us identify the species, although the birds may use them in the context of intraspecific behaviour. These are the songs the males sing, about 75% of the time. In contrast, songs which mimic the hosts are clear whistled notes and each male indigobird has several versions. The *chick-pea-pea-pea* song which mimics the Red-billed Firefinch has a rising two-tone alarm call *chick* and then a series of simple clear whistles, *pea, pea* which often rise in pitch. Sometimes the whistled notes fall in pitch, and sometimes they fall and then rise[23,25,32], but the overall song pattern is similar. The songs can be identified in a few minutes, since a male usually sings both mimicking and chattering sets within this time.

The adult male indigobird also mimics the begging calls of the young firefinch as they are given by the firefinch at different ages. Remarkably, the adult male indigobird mimics not only the begging calls of the young firefinch (and these calls vary among the species of hosts of the indigobirds), but he also gives the begging calls of the young indigobird, which are

similar to the begging calls of the host, differing only in detail. When they are young nestlings and fledglings, Village Indigobirds give a single kind of call (a rhythmically repeated short note) when begging from their foster parents, whereas nestling and fledgling Red-billed Firefinches irregularly alternate between two kinds of call (one of them a short note, and the other a clear whistle which slurs upwards in pitch). As the firefinch matures this whistled note develops into the contact call of the adult, and the short note develops into the alarm call of the adult firefinch. In contrast, the begging call of the young indigobird is remarkably similar across species of indigobirds[20,22]. In a mixed brood of recently fledged young firefinches and indigobirds all attended by a pair of foster Red-billed Firefinches, both in our aviaries and in the field where we observed them at Dumbi Hill near Zaria, Nigeria, the two kinds of young give the different calls and are both fed without discriminations by the adult firefinches.

The young bird has a mouth pattern matching the young Red-billed Firefinch. The mouth has a yellow palate with a ring of five black spots and a pair of white papillae with a blue base at each side of the gape. At Lochinvar National Park in Zambia, six nestling indigobirds with this pattern, all from the nests of Red-billed Firefinches, were reared in captivity. The young indigobirds and independent juveniles with the same mouth pattern were observed over a period of months in captivity[20,21], and all developed the red bill and feet of the local Village Indigobirds.

Purple Indigobird *V. purpurascens*

Purple Indigobirds are purplish or bluish-purple in male breeding plumage, which is not very glossy and sometimes appears black. The wings are brown not blackish, the bill is white, and the feet are puce to pale pink. Purple Indigobirds are widespread in southern and East Africa in drier bush, including Serengeti National Park at Kirawira in Tanzania, and Lengwe National Park in Malawi[20,31,32]. The females have grey feet, but the plumage of all indigobird females is streaked brown and not distinctive.

The songs mimic those of the Pink-backed Firefinch (Jameson's Firefinch) *L. rhodopareia.* The distinctive feature is a firefinch-like 'purr' alarm call with rapid notes, more than 22 per second, which sound like a purring cat. The purring is too fast to reproduce with our lips, in contrast to the slower alarm calls of the Blue-billed Firefinch *L. rubricata* and its indigobird parasites. The mimicked songs have the Blue-billed's slow and fast trills, where a short, clear whistled note is repeated in a series, a two-part whistle *t'we t'we,* and a long whistle *feeew* like a female firefinch[20,32]. The easiest call to use in identifying the bird is the 'purr' – the word reminds one of the colour and name of the Purple Indigobird.

Juvenile indigobirds at Lochinvar National Park were nearly identical to the nestling and juvenile Pink-backed Firefinches in having a pink palate. A broad pinkish-violet oral flange extends between the two small white papillae at each side of the gape, and a narrow blue band separates the pink and white[20,32]. Pink-mouthed juvenile indigobirds were caught and kept until they developed adult plumage. The males were a dull purplish-blue similar to adult Purple Indigobirds, and both sexes had whitish bills and pale purplish feet[21].

Indigobird sp *Vidua sp*
Mark Andrews

Dusky Indigobird *V. funerea*

Dusky Indigobirds mimic the songs of the Blue-billed Firefinch (African Firefinch) *L. rubricata.* In South Africa the breeding male indigobirds *V. f. funerea* have bright orange feet[20]. In eastern Zimbabwe and north through Zambia, Malawi, and western Tanzania and Kenya they have pale purplish feet. The bill is white, and the wings are brown not black. The pale-footed birds *V. f. nigerrima* that mimic the Blue-billed Firefinch are thought to be the same species as the orange-footed birds of South Africa, because they mimic the same firefinch, and they are similar in plumage, bill and foot colour, and size[32].

Breeding males are nearly the same colour as Purple Indigobirds, though some are more bluish and none is as purplish as the most purple males. In

Kenya, where these two indigobirds occur together (along with Village Indigobirds) on the west slope of the Kerio Valley, they do not differ in appearance[31,32]. Both are dull bluish-purple in male breeding plumage, have dark brown wings, a white bill and light purplish feet. Females of these two indigobirds, seen and taken in Transvaal, Zimbabwe and Malawi as they visited the males at their singing and mating sites, are indistinguishable in plumage, bill and feet colours[20,32]. Their similarity may not indicate inter-breeding, rather it may indicate a recent speciation.

Male Dusky Indigobirds were tape-recorded with the songs and calls of the Blue-billed Firefinch in eastern Transvaal (Tzaneen), north-eastern Zambia (Sumbu National Park), eastern Zimbabwe (Mutare, Chipinge, Rusitu River), Malawi (Livingstonia area, Rumphi area, Lilongwe, Namadzi, Limbe, Chididi Mission) and western Kenya (Kerio Valley), and David Moyer has taped them at Sumbawanga in western Tanzania. The distinctive calls include a *pit pit* alarm with notes being repeated no more rapidly than 20 per second, and often slower than ten per second; whereas the notes of the 'purr' of Pink-backed Firefinch are repeated more than 22 per second. The *pit pit* series is just slow enough for a fast-lipped person to give at the same rate as the bird. Blue-billed Firefinch also has a series of calls and songs characterised by inverted shallow 'V'-shaped notes in an audiospectrogram (*tsee wee wee*), slurred whistles and series of whistled *too-too* notes[20,22,32].

The mouth pattern of nestling and juvenile Blue-billed Firefinches is distinct. The young in Cameroon, in Malawi, and in my captive-reared offspring of adults from Tanzania have a yellow palate with three black spots and two pairs of distinct gape papillae, each with a dark blue tip and paler base and a narrow pinkish-violet band between them[22,32]. The young Dusky Indigobirds may have the same pattern and colours. The only description of a juvenile was in the Vumba highlands of eastern Zimbabwe, where Blue-billed Firefinch is the only firefinch. The young indigobird had blue papillae, and the palate was not described[12,24]. The blue papillae distinguish it from the other species in southern Africa, and indicate that the indigobirds associated with the Blue-billed Firefinch are genetically distinct (and do not differ just in their learned songs) from the indigobirds associated with Pink-backed Firefinch. At Lilongwe in Malawi, in the 1960s, D.N. Mansfield found Blue-billed Firefinch and indigobird young with matching mouth patterns[32]. It is much desired to observe further details of the young brood parasites in the field, either in nestlings or in birds caught in family groups with their firefinches.

Peters' Twinspot Indigobird *V. codringtoni*

Indigobirds with the songs of Peters' Twinspot *Hypargos niveoguttatus* were first tape-recorded in eastern Zimbabwe in 1967, but at that time the indigobirds were thought to be limited to firefinches and their mimicry songs were not identified as twinspot songs until 1991. The male indigobirds are distinct with bright, glossy blue or green breeding plumage, black wings, white bill, and bright orange or red feet (the remaining species all have pale feet). Females have a whitish bill, orange feet, and a more distinct grey breast than other indigobirds.

The most distinctive and frequently heard Peters' Twinspot phrase is an alarm trill *trrrrrrrreee*. It is higher in pitch (at 7–8 kHz) than the alarm 'purr' of Pink-backed Firefinch or *pit pit* of Blue-billed Firefinch (4–6kHz)[11,31,32]. In addition, twinspots have a simple song consisting of a high *treeee* followed by lower whistles and a rapid chatter. Twinspots also have a long, complex and soft song given at close range in sexual display and this combines several whistles, trills and chatters. Finally, they have short excitement calls *sip* and *tsisi* and the young have begging calls not unlike those of the firefinches. The indigobirds mimic all these songs and calls[31,32]. Since they are unique in appearance, it is only necessary to listen for the mimicry songs of the indigobirds to confirm their identification in the field.

Peters' Twinspot Indigobirds occur from southern Tanzania through the Luangwa and Kafue river thicket country of southern Zambia, northern and eastern Zimbabwe, southern Malawi and neighbouring Mozambique. Sightings of red-legged, white-billed indigobirds had puzzled birders in northern Zimbabwe, because these birds were assumed to be the Dusky Indigobird brood parasite of Blue-billed Firefinches, but this firefinch does not occur there[6]. Peters' Twinspots occur near Kadoma, Kwekwe, and in riverine thickets on the Gwaai River east of Hwange National Park, where the white-billed, red-footed indigobirds are seen[31,32]. In eastern Zimbabwe the indigobirds are seen near Mutare on the Penhalonga road and at 'Premier Estate' and south to Rusitu River and Chipinge ('Christina'). In Zambia, their songs have been tape recorded at Lochinvar National Park and near Lusaka airport[31,32] (R. Stjernstedt, pers comm). In Malawi they can be seen near Zomba, at Limbe, at Likulezi Mission north of Mt Mulanje and at Lengwe National Park. Peters' Twinspots live in all these areas[31,32].

Brood parasitism upon Peters' Twinspot remains to be observed directly in the field. Young twinspots have a unique nestling mouth pattern – a yellow

palate with three black spots, and a yellow gape with two thick, light yellowish swellings on each side. In the fledgling the swellings coalesce and the tip of the lower one is orange[31,32]. No young indigobird with the same mouth pattern has been reported.

Black-faced Firefinch Indigobird *V. larvaticola*

Black-faced Firefinch Indigobirds mimic the Black-faced Firefinch *L. larvata*. They are known in the field at Zaria, west of Jemaa, in the agricultural area near Assop Falls, at Panshanu Pass, Bauchi and Yola in Nigeria and at Garoua in Cameroon[20,22,29,] (pers obs), where the firefinch is grey in plumage. The corresponding race of 'vinaceous firefinch' in the far west of West Africa, and the 'masked firefinch' in Ethiopia is a mix of red and grey, but both have the same songs[17,20,22]. Female indigobirds visiting these males in Nigeria look like other female indigobirds in the area. Males have glossy blue to green-blue breeding plumage, pale brown wings that contrast with the 'black' body plumage, pale purplish feet and a white bill. Not all these song mimics are different in size and plumage colour from the next indigobird species[29]. They are also known as Bakà Indigobirds.

The songs of the Black-faced Firefinch contain series of slow, slurred whistles given in threes, fours or more units, and sound like *tuu-ii, tuu-ii* with notes falling then rising in pitch, or *whee-hew, whee-hew* with notes rising then falling with an accent on the falling note. The alarm note is a sharp repeated note *dwit-it-it* and the contact call is a shrill *seesee*[4,22]. The indigobirds give the same calls along with their non-mimetic songs[20,22].

Brood parasitism is known from fledglings in family groups of the firefinches at Zaria, Nigeria. The mouth pattern of the young indigobirds is like that of the firefinches – a yellow palate with a ring of five black spots, orange deep inside the mouth, a pair of blue papillae at each gape, and a shallow dark blue ridge on the edge of the mouth behind the papillae[22].

Cameroon Indigobird *V. camerunensis*

Cameroon Indigobirds are glossy blue in male breeding plumage and have contrasting pale brown wings, the feet are pale purplish and the bill is white. Females look like other female indigobirds. Singing males have been watched in the field in Sierra Leone, Ghana and Cameroon, and from museum specimens the species occurs from Senegal to Nigeria, Ethiopia and northern Zaire (Uelle region). Each male mimics the songs of one kind of foster finch and males of the same appearance mimic at least four foster species: (1) Blue-billed Firefinch, (2) Black-bellied Firefinch *L. rara*, (3) Brown Twinspot *Clytospiza monteiri* and (4) Dybowski's Twinspot *Eustichospiza dybowskii*[22,29,30]. Since they all look alike, these indigobirds are considered one species, at least until we find genetic differences between them, and not just the foster songs they learn.

The songs of these foster species are quite distinct and they can be readily distinguished in the field. Blue-billed Firefinches in West Africa sound much like they do in southern and East Africa; the indigobirds that are associated with them do not appear to intergrade between these two areas, so they are called two distinct species. Black-faced Firefinches have a song of four or more repeated, low whistled notes *tew-tew-tew-tew*. The contact call is a plaintive low whistle which rises quickly and then falls slowly in pitch, *peeeh*. They also have a distinctive sharp alarm call *chek*. The whistled notes are like some of Blue-billed Firefinch; the most distinctive call is the contact call[4,22]. Brown Twinspots have a contact call *vay, vay* (a narrow, inverted 'V' call on the audiospectogram), a sharp alarm call *tek tek tek* and a song that includes a series of whistles with these calls[29]. The full songs when mimicked have short trills and notes without the harmonic overtones of Dybowski's Twinspots, but are similar in their complexity to the songs of those twinspots. Dybowski's Twinspots have alarm calls *zet*, contact calls *kek* and *churr* and a distinctive song. The remarkable complex song has many kinds of phrases including a canary-like whistled trill *rrrrrr* and a unique buzzy whistle *vweee* which sounds like a kazoo being blown (a musical instrument which produces a buzzy sound)[4,29].

Indigobirds that mimic the songs of these four species in parts of West Africa look alike and are now considered a single species. Cameroon Indigobirds at Kabala, Sierra Leone, mimic Blue-billed Firefinches and Dybowski's Twinspots[29]. At Lovi Camp in Mole National Park and at Damongo in Ghana they mimic Black-bellied Firefinches[22]. Along the road from Baissa to Abong in SE Nigeria some males mimic Brown Twinspots and possibly others mimic Blue-billed Firefinches (pers obs), At Ngaoundéré, Tibati and Banyo in Cameroon they mimic Blue-billed Firefinches, and at Tibati they mimic Brown Twinspots[29].

It is unknown whether the different song populations have young that match each of these host species. A juvenile at Tibati, Cameroon, had a mouth like that of the nestling Black-bellied Firefinches that were found in another nest, a lilac palate with five black spots, red areas on the side of the palate, and a violet gape flange with two pale blue papillae[22,29]. A nestling at Banyo, Cameroon, that looked like the smaller

Table 1: Plumage and mimicry songs of male indigobirds *Vidua* species
***Table 1: Plumage et chants de mimétisme des Combassous* (Vidua) mâles**

Indigobird species	Region[1]	Plumage	Wing	Foot	Host	Mimicry song
Village *V. chalybeata*						
V.c. chalybeata	W. Africa	green or blue	black	orange to red	*L. senegala*	*chick-pea*
V.c. ultramarina	N.E. Africa	purple	black	orange to red	*L. senegala*	*chick pea*
V.c. centralis	E. & C. Africa	steel-blue	dark brown	orange to red	*L. senegala*	*chick pea*
V.c. amauropteryx	S. Africa	steel-blue	dark brown	orange to red	*L. senegala*	*chick pea*
Purple						
V. purpurascens	S., C. & E. Africa	dull purple	brown	pale purplish	*L. rhodopareia*	*purrr, feeew*, whistles and trills
Dusky *V. funerea*						
V.f. funerea	S. Africa	purplish blue	brown	orange to red	*L. rubricata*	*pitpitpit*, whistles and trills
V.f. nigerrima	C. & E. Africa	purplish blue	brown	pale purplish	*L. rubricata*	*pitpitpit*, whistles and trills
Peters' Twinspot						
V. codringtoni	S. & C. Africa	green to blue	black	orange to red	*H. niveoguttatus*	*trrrrrrrrree*, also a song: *treeee* then lower whistles and a rapid chatter
Black-faced Firefinch						
V. larvaticola	W. Africa, ? Sudan	greenish blue	darkish brown	pale purplish	*L. larvata* [2]	*whee-hew* whistle, *dwit-it-it*, seesee
Cameroon						
V. camerunensis	W. Africa	blue	brown	pale purplish	*L. rubricata* [3]	as for *V. funerea*
					L. rara	song, 4 or more low whistled notes, *tew-tew-tew-tew*, a plaintive *peeeh, chek*
					C. monteiri	long complex songs, notes include *vek, vay, tek* trills and whistles, lack overtone
					E. dybowskii	*zet, kek, churr* and a complex song with harsh chatters, a canary-like trill *rrrrrr* and a buzzy whistle *vweee* with overtones
Jos Plateau						
V. maryae	N.-C. Nigeria	green	brown (large)	pale purplish	*L. rubricata*	*pitpitpit*, whistles, trills including a descending trill
Goldbreast						
V. raricola	W. Africa	blue to green	brown	pale purplish	*A. subflava*	*chip, chirp, ink churr churr, trip* reeling begging calls
Quail-finch						
V. nigeriae	W. Africa	dull green	brown	pale purplish	*O. atricollis*	*click, clack, cloik!, clek, tink*
Bar-breasted						
V. wilsoni	W. Africa, Sudan	purplish	dark brown	purplish	*L. rufopicta*	jingling song

1. West Africa here extends from Senegal to Cameroon. Some species may be more widespread but identification by song has not been attempted from the Central African Republic, to Sudan and Ethiopia, few specimens have been collected, and the species of these indigobirds are uncertain on the basis of museum specimens alone.
2. *L. larvata* here includes the forms *nigricollis* and *vinacea*.
3. *L. rubricata* song mimics with blue plumage are known in Sierra Leone and Cameroon and are suspected in S.E. Nigeria.

Blue-billed Firefinches in the nest[22] may have been an early-hatched firefinch rather than an indigobird. No young indigobirds have been seen with the mouth pattern of the young twinspots. This may not be because they do not have such a pattern, but because there has been little fieldwork. For example only one nest has been found for Dybowski's Twinspot in the field. The nest was near the ground in a clump of grass near a trail at Freetown, Sierra Leone, an area with no indigobirds, in October; it had eggs and was later taken by a predator (G. D. Field, pers comm)[30].

Jos Plateau Indigobird *V. maryae*

The Jos Plateau Indigobird is known only where it has been tape-recorded at Panshanu Pass, at Taboru Hill near Jos, and at Kagoro in northern Nigeria[21,25,27,] (pers obs). Males are glossy green in breeding plumage, the wing is pale brown, the feet are pale purplish and the bill is white. They are larger (wing 68–69 mm) than other pale-winged indigobirds. Males mimic the trills of Blue-billed Firefinches which occur in these areas. This form is recognised as a distinct species because it has apparently independently colonised this firefinch from another indigobird population, perhaps from the green Black-faced Firefinch Indigobird, or from the green Goldbreast Indigobird. Also, the Jos Plateau Indigobird is discontinuous in appearance with the blue Cameroon Indigobird song-mimics of Blue-billed Firefinch and it is less like them in appearance than like another indigobird. Blue-billed Firefinches in northern Nigeria in the area of the Jos Plateau have a distinctive plumage and song as well, including a descending trilled whistle at each locality where it is known in Nigeria, but at no localities in Sierra Leone, Cameroon or Cape Coast, Ghana. Brood parasitism by this indigobird has not been observed and the young are not known.

Goldbreast Indigobird *V. raricola*

Goldbreast Indigobirds are bright glossy green in male breeding plumage, have brown wings, pale purplish feet and white bills. They are smaller than Jos Plateau Indigobirds, but otherwise look the same, and are also known as Jambandu Indigobirds[22,29]. They are widespread from Sierra Leone to northern Zaire and southern Sudan, and have been watched in northern Sierra Leone (Musaia, Kabala), in Nigeria (WAMCO farm swamp north of Vom), and in northern Cameroon (Ngaoundéré, Tibati, Banyo). In all these areas the males mimic the calls and songs of the sympatric Goldbreast.

Distinctive Goldbreast calls include the contact calls *chit chit* and *chirp*, a social call *ink churr churr*, a series of twittering notes and a flight call *trip*[4,29], but the most distinctive are the juveniles begging for food. These form a series of song-like chinking notes that rise and fall in pitch, which are not well described in words, but form 'M' and 'W' shaped notes in an audiospectrogram, and sound like a rhythmic reel somewhat like an Australian Splendid Fairy-wren *Malurus splendens* or Superb Fairy-wren *M. cyaneus*[33]. The mimetic songs of the indigobirds include the calls which match those given by nestling and fledgling Goldbreasts in our aviaries (where we have recorded the soft calls with more success than in the field)[29]. The young indigobirds have a simpler mouth pattern than the young Goldbreasts, which have 16 black spots on the palate, the floor of the mouth and the inner oral flange, and several of these black spots have white spots in their centres; but the indigobird young differ from other kinds of indigobirds[29] (pers obs). Fledged young indigobirds accompanied by adult Goldbreasts have been seen at Tibati in Cameroon[29].

Indigobird sp *Vidua sp*
Mark Andrews

Quail-finch Indigobird *V. nigeriae*

Quail-finch Indigobirds are dull green, have a pale wing, pale purplish feet and a white bill. Their plumage colour is not distinctive in the field. Hours of watching a bird in bright sun on the Benoue River flood-plains at Garoua, Cameroon, led to discussions about whether it was green, blue or purple, a question resolved only when the bird was netted and compared in the hand with a colour book. Breeding plumage is much less bright than that of the Goldbreast Indigobird[29].

Quail-finches are the most terrestrial of the common African estrildid finches, living in nearly treeless areas, and nesting in clumps of grass following the rains. Often calling in flight with distinctive *clek* and *tink* notes, their loud songs alternate high and low notes in a harsh, staccato pattern, with a wind-clapper like sound: *click clack cloik!* These songs were recorded from mystery indigobirds in the few trees on the Garoua flood-plain in 1979 and 1980, but were not identified as Quail-finch mimicry until 1992 when they were compared with audiospectrograms[11,19] and recordings. Both the indigobirds and the local Quail-finches were recorded again at Garoua in 1992[29].

Quail-finch Indigobirds are known from observations at Garoua, where they also were collected in 1909, and specimens are known from The Gambia and the type locality of the species at Kiri in Nigeria[29]. All these localities are on river flood-plains – the Gambia River, Benoue River, and the Gongola River at Kiri a few kilometres upstream from its confluence with the Benoue. They are also common around the agricultural areas near Bukuru and Rayfield in Nigeria, where dams that were created during tin mining activities in the past half of the century are now used to pump water into dry-season fields of peas, beans, tomatoes and peppers. Quail-finch Indigobirds behave like other indigobirds. A male at Garoua in Cameroon and another colour-ringed male at Rayfield in Nigeria attracted several females by singing at the same call-site over a few weeks. He courted them by hovering overhead as they perched on his call-site, mated with one female there, and then flew to seeding grasses a few metres away, mimicked host songs, and attracted the females who fed alongside him.

Bar-breasted Firefinch Indigobird *V. wilsoni*

Bar-breasted Firefinch Indigobirds are purple in male breeding plumage, have dark brown wings (darker than in other West African birds except *V. chalybeata*), pale purplish feet and white bills. They are smaller than the purplish birds in southern and East Africa, and average smaller than all other pale-winged indigobirds in West Africa. The females are not distinguishable from other kinds of indigobirds.

The Bar-breasted Firefinch has a distinctive song with short notes that jump around in pitch; a few notes are short whistles no longer than 0.1 seconds. The parts seem unrelated to each other with high metallic and low nasal notes in a rapid and irregular pattern, but this pattern is repeated the next time the bird gives a song. The alarm call is a sharp *pik*, either single, double or repeatedly staccato[4,22]. The indigobird mimics these sounds[22].

Bar-breasted Firefinch Indigobirds are known from field recordings in Ghana (Cape Coast University), Nigeria (Zaria, upper Assop Falls, Vom, Bukuru, Rayfield and Yankari National Park) (pers obs) and Cameroon (near Touroua, Ngaoundéré, Tibati, Banyo), while museum specimens indicate that they occur in many other localities from Senegal and The Gambia to Sudan and Zaire[22,32].

Brown Firefinch *L. nitidula* south of the Equator is the geographic counterpart of the Bar-breasted Firefinch of west-central and West Africa, and may be a race of this species. The songs and calls of these two firefinches are the same[22]. Captive indigobirds from an unknown source were said to give songs of Brown Firefinch, and the indigobirds were larger than the west African birds, but were not said to differ in size or colour from the Dusky Indigobirds or Purple Indigobirds of south-central Africa[18]. Their species status is unknown – they may be one of these last two indigobirds that learned the songs of this firefinch[26]. In 1972, I looked for such indigobirds in areas where Brown Firefinch occur in Northern and Luapula provinces in Zambia, but did not find them there, and the only indigobirds found were song mimics of Red-billed Firefinch, Blue-billed Firefinch and Pink-backed Firefinch[22].

The young indigobirds have the distinctive mouth pattern of the Bar-breasted Firefinch – a gape with a swollen flange rather than distinct papillae, and a pink to reddish lilac mouth lining and palate with five black spots[18,22]. Young indigobirds have been seen and fed by the adults in family groups of Bar-breasted Firefinches at Cape Coast, Ghana, where the only adult indigobirds were song mimics of this firefinch[8,22]. I captured two others that fledged with two young Bar-breasted Firefinches at the Rockwater fish farm, Rayfield, Nigeria: these fledglings also mimicked the mouth pattern of the young firefinches.

Comments

Like the other viduine finches, indigobirds are sometimes considered to be estrildine finches, in the same systematic family as their host species, on the basis of morphology (primary coverts) and molecular genetics – ie DNA-DNA hybridisation similarities[3,15,36]. Alternatively, they may be closer to the ploceid bishops and widow finches *Euplectes*; this relationship has been suggested on the basis of their non-mimetic calls, sexual dimorphism in plumage, and seasonal changes in plumage[16].

Regardless of the origin of the viduine finches, a question that is still without a definitive answer, the indigobirds are much more similar to each other than

are their host species, and the pattern of genetic relationships between the indigobirds does not parallel those between their host species[7]. Because the indigobirds are associated with host species other than firefinches, it appears that the indigobirds have colonised their host species and diverged as species much later than the time when the hosts diverged from each other[7,29,32]. The cases where more than one species of indigobird is associated with one of the host species (Blue-billed Firefinch), and where one species of indigobird, the Cameroon Indigobird, is associated with more than one host species, may be due to recent switches by indigobirds from one host to another. When a female indigobird lays in the nest of a previously unknown host finch her young survive and fledge, her sons learn the songs of the new foster parent and the daughters are attracted to male indigobirds with those songs and to nesting finches of the species that raised them, a process which may have occurred in the origin of new species of indigobirds[20]. Also, we see the odd bird with a song other than his species' usual song, about one bird in a hundred where there are two or more kinds of indigobirds in the same locality. For example, one Red-billed Village Indigobird at Lochinvar National Park in Zambia mimicked the song of a Pink-backed Firefinch rather than a Red-billed Firefinch[20,23]. These observations mean that mimicry song alone may not always tell us which species of indigobird is singing, and a good eye along with a good ear will help the field observer.

Species names of indigobirds have shifted from the time when the species were recognised only on the basis of their similarity in plumage colour. Some recent name changes reflect improving knowledge of species' host-parasite relationships and also on both the biological species and the phylogenetic species' concepts. (1) at one time, *V. codringtoni* was considered a subspecies of *V. funerea*[20]; an idea based on a lack of understanding of the songs of Peters' Twinspot. Peters' Twinspot mimics were recorded as early as 1967 in Zimbabwe and Malawi, but only in 1991 were the twinspots and indigobirds heard together and their songs recognised as the same[31,32]. (2) *V. funerea nigerrima* and *V. purpurascens* are practically identical in plumage in populations in Zimbabwe and Malawi; whereas some *purpurascens* are more purplish, and some *nigerrima* are more blue in plumage, at least half of the specimens for which songs were recorded are not distinguishable by plumage[31,32]. The reason why these forms are considered different species, while the West African birds that mimic several host species are all called a single indigobird species *V. camerunensis*, is that the mouth markings of the young appear to be distinct in *nigerrima* and *purpurascens* in Zambia and Zimbabwe[32]. (3) The indigobirds that are associated with the Blue-billed Firefinch in West Africa and the birds in southern and East Africa do not appear to intergrade between these two areas, so they are called two distinct species, *V. camerunensis* in West and *V. funerea* in southern and East Africa. (4) *V. camerunensis* in West Africa may yet prove to be a complex of several species, but there are no observations that the indigobirds which parasitise Blue-billed Firefinch, Black-bellied Firefinch, Brown Twinspot and Dybowski's Twinspot in this area are distinct in their genetically-determined mouth markings. Field observations are needed on breeding finches in this area. (5) *V. maryae* the large, green indigobirds of the Jos Plateau that mimic the songs of Blue-billed Firefinches in this part of Nigeria, are distinct in size and colour from the mimics of this firefinch elsewhere in West Africa[22,29]. Our field work in 1995 in Taboru near Jos, Nigeria, was consistent with the earlier field observations from Panshanu and Kagoro of large, green birds that mimicked these songs. In the total sample of six green males, all were larger (wing length 68–69 mm) than all blue song mimics of Blue-billed Firefinch in Cameroon (wing length 64–66 mm). The blue and green birds are not known to intergrade, and most of the habitat between known populations is unsuitable for the host species (to the east, south, and west of Jos Plateau, the hot, dry valleys of the great rivers of Nigeria, the Gongola, Benoue and Niger, appear unsuited for this firefinch, though west of Jos Plateau they may occur as far as Akwanga, and further field observations may extend the range of host and parasite beyond where they are known in Nigeria). The green indigobirds *V. maryae* of the Jos Plateau are also larger than the glossy green *V. raricola* mimics of Goldbreast (wing length 61–67 mm) and are larger than the dull green *V. nigeriae* mimics of Quail-finch (wing length 63–66 mm) in Nigeria and in Cameroon ([22,29,] pers obs). These large green indigobirds known as *V. maryae* appear to represent a separate colonisation by the brood parasites of the host Blue-billed Firefinches in West Africa, so, from a phylogenetic point of view, they are a separate lineage that is independent of the blue mimics of this firefinch elsewhere in West Africa, and from a biological species perspective they have distinct songs (descending trills) from the others, and the green and blue populations are not known to intergrade over space, so there is no evidence that they would interbreed. Breeding plumage colour is obvious only when indigobirds are netted and held in the

hand together with a colour standard: it is not easy to see in the field.

Indigobirds as a group are also known by other names – the alternate 'indigo-birds' in Mackworth-Praed and Grant[9,10], 'indigo finches' in Bannerman[1], 'widowfinches' in South Africa[11,34], and 'combassous' in the cagebird trade. Not all the birds are indigo in male plumage colour, but the name attracts attention to the importance of colour in the breeding plumage and the name 'indigobird' has been more or less consistent in recent publications.

Acknowledgements

Fieldwork was encouraged by K. Hustler, M.P.S. Irwin and J. Williams in Zimbabwe, P. Jones in Botswana, H. Friedmann, G. Ranger and J.M. Winterbottom in South Africa, D.H. Eccles, S. Lane and M.E.D. Nhlane in Malawi, R.J. Dowsett, J. Colebrook-Robjent and R. Stjernstedt in Zambia, J.P. Rood in Tanzania, J.F.M. Horne and J.G. Williams in Kenya, N.F. Ekue in Cameroon, H.Q.P. Crick, M.E. Dyer, C.H. Fry, M.D. Hopkins, R.E. Sharland, N.J. Skinner and R. Wilkinson in Nigeria, E.O.I. Asibey and D.S. Djangmah in Ghana, and G.D. Field and H.S. Thompson in Sierra Leone. For field observations, I thank R. Breitwisch, B. Chipeta, A. Craig, G.D. Field, M.E. Gartshore, K. Groschupf, M. Hopkins, N. Klein, K. Klitz, W. Klitz, D. Lewis, J. Makawa, D. Moyer, M.E.D. Nhlane, L. Payne, C. Risley and R. Stjernstedt. Copies of tape recordings have been deposited with C. Chappuis and the British Library. The research was supported by the University of Michigan Faculty Research Fund, National Geographic Society, and National Science Foundation.

References

1. Bannerman, D.A. 1949. *The Birds of Tropical West Africa*. Vol 7. London: Crown Agents.
2. Benson, C.W., Brooke, R.K., Dowsett, R.J. and Irwin, M.P.S. 1971. *The Birds of Zambia*. London: Collins.
3. Bentz, G.D. 1979. The appendicular myology and phylogenetic relationships of the Ploceidae and Estrildidae (Aves: Passeriformes). *Bulletin of the Carnegie Museum of Natural History* 15: 1–25.
4. Goodwin, D. 1982. *Estrildid Finches of the World*. Ithaca, New York: Cornell University Press.
5. Immelmann, K., Steinbacher, J. and Wolters, H.E. 1965. *Prachtfinken*. 2nd. rev. ed. vol. 1: Astrilde, Aachen: Verlag Hans Limberg.
6. Irwin, M.P.S. 1981. *The Birds of Zimbabwe*. Harare: Quest.
7. Klein, N.K., Payne, R.B. and Nhlane, M.E.D. 1993. A molecular perspective on speciation in the brood parasitic *Vidua* finches. *Proc. VIII Pan-African Ornithological Congress*: 29–39.
8. Macdonald, M.A. 1980. Observations on Wilson's Widowfinch and the Pintailed Whydah in southern Ghana, with notes on their hosts. *Ostrich* 51: 21–24.
9. Mackworth-Praed, C.W. and Grant, C.H.B. 1963. *African Handbook of Birds, series II: Vol. 2. Birds of the Southern Third of Africa*. London: Longman.
10. Mackworth-Praed, C.W. and Grant, C.H.B. 1972. *African Handbook of Birds, series III: Vol. 2. Birds of West Central and Western Africa*. London: Longman.
11. Maclean, G.L. 1993. *Roberts' Birds of Southern Africa*, 6th ed. Cape Town: John Voelcker Bird Book Fund.
12. Manson, C. and Manson, A.J. 1984. Breeding record of the Brown-backed Firefinch Indigobird. *Honeyguide* 30: 131–132.
13. Morel, G. 1959. Le parasitisme de *Lagonosticta senegala* (L.) par *Hypochera chalybeata* (Müller). *Proc. I Pan-African Ornithological Congress*: 157–159.
14. Morel, M.-Y. 1973. Contribution à l'étude dynamique de la population de *Lagonosticta senegala* L. (Estrildides) à Richard-Toll (Sénégal). Interrelations avec le parasite *Hypochera chalybeata* (Müller) (Viduines). *Mémoires Museum National d'Histoire Naturelle, serie A., Zoologie* 78.
15. Morlion, M.L. 1980. Pterylosis as a secondary criterion in the taxonomy of the African Ploceidae and Estrildidae. *Proc. IV Pan-African Ornithological Congress*: 27–41.
16. Nicolai, J. 1964. Der Brutparasitismus der Viduinae als ethologisches Problem. *Zeitschrift für Tierpsychologie* 21:129–204.
17. Nicolai, J. 1965. *Prachtfinken* (45-rpm sound recording 75-0932.5). Kosmos Lehrmittel, Stuttgart.
18. Nicolai, J. 1972. Zwei neue *Hypochera*-Arten aus West-Afrika. *Journal für Ornithologie* 113: 229–240.
19. Nuttall, R.J. 1992. Breeding biology and behaviour of the Quail Finch *Ortygospiza atricollis*. *Ostrich* 63: 110–117.
20. Payne, R.B. 1973. Behavior, mimetic songs and song dialects, and relationships of the parasitic indigobirds (*Vidua*) of Africa. *Ornithological Monographs* 11.
21. Payne, R.B. 1977. Clutch size, egg size, and the consequences of single vs. multiple parasitism in parasitic finches. *Ecology* 58: 500–513.
22. Payne, R.B. 1982. Species limits in the indigobirds (Ploceidae, *Vidua*) of West Africa: mouth mimicry, song mimicry, and description of new species. *Misc. Publ. University of Michigan Museum of Zoology* 162: 1–96.
23. Payne, R.B. 1985a. Behavioral continuity and change in local song populations of Village Indigobirds, *Vidua chalybeata*. *Zeitschrift für Tierpsychologie* 70: 1–44.

24. Payne, R.B. 1985b. Song populations and dispersal in Steelblue and Purple Widowfinches. *Ostrich* 56: 135–146.
25. Payne, R.B. 1990. Song mimicry by the Village Indigobird (*Vidua chalybeata*) of the Red-billed Firefinch (*Lagonosticta senegala). Vogelwarte* 35: 321–328.
26. Payne, R. B. 1994a. The species of indigobirds *Vidua* in Zimbabwe. *Honeyguide* 40: 78–86.
27. Payne, R. B. 1994b. Brood parasitism in Nigerian birds, pp. 53–56. In: *The Birds of Nigeria,* 2nd edition. Ed. by J. H. Elgood. B.O.U. Checklist no. 4.
28. Payne, R.B. and Payne, K. 1977. Social organization and mating success in local song populations of Village Indigobirds, *Vidua chalybeata. Zeitschrift für Tierpsychologie* 45: 113–173.
29. Payne, R.B. and Payne, L.L. 1994. Song mimicry and species status of the indigobirds *Vidua*: associations with Quail-finch *Ortygospiza atricollis,* Goldbreast *Amandava subflava* and Brown Twinspot *Clytospiza monteiri. Ibis* 136: 291–304.
30. Payne, R.B. and Payne, L.L. 1995. Song mimicry and association of brood-parasitic indigobirds *Vidua* with Dybowski's Twinspot *Eustichospiza dybowskii. Auk* 112(3):
31. Payne, R.B, Payne, L.L and Nhlane, M.E.D. 1992. Song mimicry and species status of the Green Widowfinch *Vidua codringtoni. Ostrich* 63: 86–97.
32. Payne, R.B., Payne, L.L., Nhlane, M.E.D. and Hustler, K. 1993. Species status and distribution of the parasitic indigo-birds *Vidua* in east and southern Africa. *Proc. VIII Pan-African Ornithological Congress*: 40–52.
33. Payne, R.B., Payne, L.L., and Rowley, I. Kin and social relationships in Splendid Fairy-wrens: recognition by song in a cooperative bird. *Animal Behaviour* 36: 1341–1351.
34. Roberts, A. 1940. *The Birds of South Africa.* London: H.F. & G. Witherby.
35. Serle, G.J. and Morel, M.-Y. 1990. *Les Oiseaux de Sénégambie.* Paris: ORSTOM.
36. Sibley, C.G. and Ahlquist, J.E. 1990. *Phylogeny and Classification of Birds, a study in molecular evolution.* New Haven: Yale University Press.

Museum of Zoology and Department of Biology, University of Michigan, Ann Arbor, Michigan 48109, USA.

Plate 1
Breeding plumage of male Indigobirds
Plumage de reproduction des Combassous mâles

1 Village Indigobird *Vidua chalybeata amauropteryx* *(Combassou du Sénégal)*

1a *V.c. chalybeata* (head only) *(sous-espèce* V.c. chalybeata *tête uniquement)*

2 Jos Plateau Indigobird *V. maryae* *(Combassou du Plateau de Jos)*

3 Quail-finch Indigobird *V. nigeriae* *(Combassou du Nigéria)*

4 Dusky Indigobird *V. funerea* *(Combassou variable)*

5 Peter's Twinspot Indigobird *V. codringtoni* *(Combassou vert)*

6 Goldbreast Indigobird *V. raricola* *(Combassou jambandu)*

7 Bar-breasted Firefinch Indigobird *V. wilsoni* *(Combassou noir)*

8 Purple Indigobird *V. purpurascens* *(Combassou noirâtre)*

9 Black-faced Firefinch Indigobird *V. larvaticola* *(Combassou baka)*

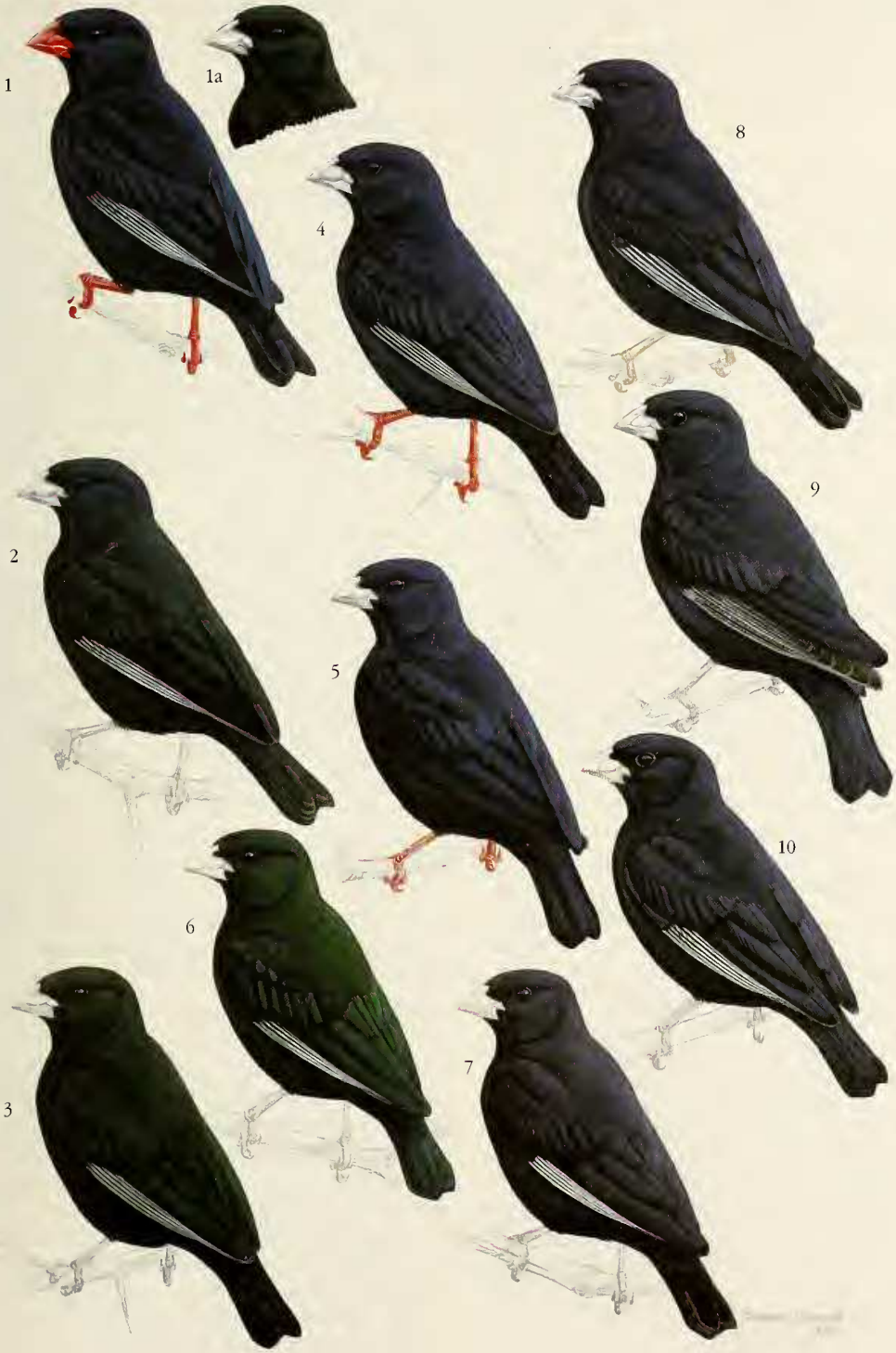
10 Cameroon Indigobird *V. camerunensis* *(Combassou du Cameroun)*

By Brian Small

The superb original painting of indigobirds by Brian Small, reproduced on the opposite page, is on sale to ABC members for offers over UK £120.

Offers should be sent to:
African Bird Club
c/o BirdLife International
Wellbrook Court
Girton Road
Cambridge CB3 0NA
UK

The closing date for offers is 30 April 1996.


1
1a
8
4
9
2
5
10
6
7
3